The claims defining the invention are as follows:

1. A power plant (referred to as a Biotower in this document) within which a current of rising air is used to drive one or more electricity generating turbines and the said air within a stack is induced to rise by being heated by: the waste heat of air conditioning systems from nearby structures; the heat trapped in heat carrier mediums such as water circulated in glazing systems (referred to as plasma glazing in this document), awnings, covered walkways and the like; the heat absorbed by hard surfaces such as road ways; the heat trapped by glass roofs and any other useful heat sources and transferred to the said chimney by appropriate heat transfer mechanisms which may preferably incorporate piped hot water (or other heat carrier mediums) to transfer the said heat and release it into air rising in the same stack preferably with the use of the evaporative method. One or more venturis to increase the velocity of said rising air may also be incorporated with the said turbine(s) if it improves its functionality and venturi(s) may also be incorporated to augment the cooling of the said heat carrier medium by utilizing the cooling effect caused by the pressure differential of the said rising air through the same venturi(s). The current invention may preferably also be used to exhaust air from places such as city centres.

2. A power plant and/or wind powered air pump (referred to as a Biotower in this document), which utilises passing wind to drive air upward within a tower configured in its internal and/or external shape in a helix type form and clad in such a way as to allow the passage of wind into the interior of the said tower so as to force the air in a motion spiralling upward within the cavity enveloped by the helix type structure and the said cladding encasing the said helix type structure and thus creating suction at lower regions of the tower and thereby draw in air at its base and expelling it at its top; the said movement of air may preferably be used to drive electricity generating turbines at the air intake of the said tower or within the same tower and wind paddles may also be used to take advantage of he concentric motion of the said spiral up draft; the said upward spiralling motion of the wind may preferably be created with the use of flaps, valves, scoops or other devices which allow the air into the structure where it is travelling in a similar direction to the said spiral updraft of air and thus augment or instigate its movement, whilst preventing the same wind from entering the same structure where the wind is travelling in a direction that is opposed to the same spiral updraft. The said flaps, valves, scoops or other devices would preferably be computer controlled in order to regulate the movement of air within the structure; however, they may also be controlled by wind sensitive mechanisms, or other appropriate devices or methods.

2a. A Biotower of claim 2 in which the said helix form type cavity is divided into an upper and a lower section along its length forming a double helix type cavity; the upper section may be opened to the external atmosphere with the use louvres, flaps, valves or other devices, which allows wind to be drawn into the said upper section and prevent the wind driven air from exiting the same upper section unless the same wind driven air is nearing the top of the tower. As the wind driven air flows up the tower, external air is sucked through air intake device(s) at the base of the tower. The lower section of the said helix form cavity would preferably be divided from the upper section of the said helix form type cavity with the use of louvres, flaps, valves and/or other devices, which preferably may be computer controlled and, in most instances, be used to allow air to be sucked into the said upper section from the said lower section and prevent the same wind from returning into the said lower section cavity. The same lower section cavity is connected to air intake devices, which would preferably be close to the tower base and therefore may form the means to supply air to the upper section cavity along all or part of its length via the said louvres, flaps, valves or other devices separating the two said sections. Air may be drawn into the upper section when the air pressure in the said upper section is lower than the air pressure in the said lower section, thus causing air to flow from the lower to the upper section of the spiral cavity in order to equalise the air pressure. The differential in air pressure between the upper and the lower section would be caused by the movement of air up the spiral cavity creating lower air pressure in the upper section the closer it is to the base of the tower. Also, wind may preferably be prevented from entering the upper section of the same cavity in the lower part of the Biotower in such a way as to maximise the updraft and drawing power caused by the wind within the spiral cavity. As the centrifugal force acting on air will also cause a differential in air pressure as it moves upward in a spiral formation causing greater air pressure near the outer perimeter of the upper section of the spiral cavity, valves, flaps or other devices that divide the upper section from the lower section should be preferably be used to allow air to flow from the lower section into the upper section where the air pressure differential is at its greatest. Air may be drawn from the lower part of the spiral cavity to the upper section of the spiral cavity by maximizing the characteristic whereby air is drawn through an opening by air passing over the same opening and therefore the said flaps, valves or other devices or openings that separate the same upper section from the same lower section should preferably be regulated in order to achieve maximum passage of air when required.

3. A Biotower of claim 2 or 2a with a vertical stack positioned concentric to the central axis of a helix type form which incorporates louvres, flaps, valves and/or other devices to allow air to pass from the interior of the said stack into the cavity enclosed by the said helix type form and its cladding; this said

passage of air should preferably occur when the air pressure surrounding the said stack is lower than the air pressure within the said stack, thus creating conditions that suck air out of the said stack and therefore draw air up the stack at a faster rate than would normally occur. Preferably a wind or air pressure driven electricity generating turbine may be incorporated within the said stack and/or at the air intake to the system and preferably paddles may also be incorporated to make use of the spiralling motion of the air to augment the generation of electricity. This same stack may also be the stack of claim 1 and utilise heated air to augment the updraft within.

4. A wind powered power plant which utilises passing wind to drive air both upward and downward within a tower formed of a double helix type form; its internal and/or external shape configured in said double helix type form in such a way as to allow the passage of wind into the interior of the said tower so as to force the air in a motion spiralling upward within first of two spiral cavities so formed, creating suction at lower regions of the tower and thereby draw in air at its base; the second of two spiral cavities also being configured in its internal and/or external shape in said double helix type form in such a way as to allow the passage of wind into the interior of the said tower so as to force the air in a motion spiralling downward within second of two spiral cavities so formed, creating suction at upper regions of the tower and thereby draw in air preferably from its upper part; the said movement of air may preferably be used to drive electricity generating turbines at the air intake(s) of the said tower or within the cavity of the same tower; the said upward movement of air may preferably be used to suck polluted air out of in city centres and prevent heat build up due to the exhaust heat from buildings in city centres; the downward air movement may preferably be used to provide ventilation and fresh air where needed and/or may be used to provide fresh air to underground tunnels and the like; the said upward and downward spiralling motion of the wind may preferably be created with the use of louvres, flaps, valves, scoops or other devices which allow the air into the structure where it is travelling in a similar direction to the spiral draft of air and thus augment its movement, whilst preventing the same wind from entering the same structure where the wind is travelling in a direction that is opposed to the said spiral draft. The said flaps, valves, scoops or other devices would preferably be computer controlled in order to regulate the movement of air within the structure; however, they may also be controlled by wind sensitive mechanisms, or other appropriate devices or methods; the said movement of air may preferably be used to drive electricity generating turbines at the air intake of the said tower or within the same tower and wind paddles may also be used to take advantage of he concentric motion of the said spiral up draft.

4a. A wind powered electricity generator of claim 4 in which the said spiral cavity containing downward flowing air is also utilised as a spiral staircase and preferably connected to a multi storey building.

5. A wind and convection current driven power plant of claims 1,2, 2a and 3 in which the spiral updraft of air created by the passing wind is used to augment the updraft of air generated by the heating of air within the tower. The same heated air would preferably be induced to move in and amongst the same spiral updraft created by the said wind and also preferably the same spiral motion of the wind would augment the motion of the said turbine if one or more said turbines are located within the shaft of the said chimney and/or in addition to the said turbines located at the said air intake of the same bio tower.

6. A wind and convection current driven power plant of claims 1 and 3 in which the spiral updraft of air created by the passing wind is used to augment the updraft of air generated by the heating of air in the tower in which the resultant heated air is allowed to rise in the said central vertical stack around which the said spiral updraft is centred; the said stack is preferably configured so as to allow the drawing of air into the perimeter spiral cavity of the tower within which the spiral air movement is contained when this said drawing of air augments the total updraft of air in the said tower. This said drawing of air from the central stack may occur when the air pressure in the perimeter spiral cavity close to the central stack is lower than the air pressure within the same central stack due to the centrifugal force acting on the air spiralling within the said perimeter spiral cavity resulting in a relatively high air pressure in the outer perimeter of the said cavity and a low pressure close to the outer face of the said central shaft thus allowing for the inducement of air from the said shaft into the said perimeter cavity provided that suitable devices are incorporated to allow for and control this movement of air.

7. A Biotower of claims 1 to 6 in which a transparent or semi opaque cladding is incorporated to enclose the said structure to allow solar radiation to pass into the interior of the said structure in order to further heat the air within the said structure and thereby augment the said updraft of air. Preferably the said transparent cladding would be glass and would preferably be coated or manufactured in such a way so as to allow the majority of the sun's radiation to pass through it and into the said interior and prevent as much as possible of the same solar radiation from passing out from the said interior to the exterior. Preferably the said transparent cladding may consist of more than one layer and configured in such a way as to allow the passage of solar radiation into the structure and prevent the passage of heat and electromagnetic radiation through the same cladding from the interior to the exterior and the said layers

may preferably be configured with cavities between the same layers to minimise heat loss through the exterior cladding of the said Bio Tower.

8. An air pump and/or power plant of any of the above claims formed into a tower in which a glass roof is incorporated at the base of the tower in order to trap the energy of the sun and transfer that same energy into the said tower. Preferably the said glass roof consists of more than one layer of glass with one or more air cavities between the said layers, the top layer(s) allowing the sun's radiation to pass through it but preventing most of the resultant heat and electromagnetic radiation from passing back out again; the lower layer(s) of glass reflecting the sun's radiation back into the said air cavity and thus trapping much of the sun's energy within the air cavity; preferably the same air cavity is so connected to the said tower to facilitate the heated air within the said cavity to flow into the tower in such a way as to augment the said tower's functions, specifically the creation of upward air movement within the said tower. The said glass roof may also be clad with any suitable transparent or semi opaque material.

9. A solar radiation collector (referred to as plasma glazing in this document) designed to expose a heat carrier medium such as water as or a gas to solar radiation within one or more cavities between or enveloped by two or more layers of glass or other preferably transparent or semi opaque material; the said heat carrier medium is thus heated or otherwise transformed due to its exposure to said solar radiation and may then be circulated or transferred preferably to the said Biotower of claims 1,3,5,6 and 7 or other devices via pipes or ducts or the like, in order to extract the same heat and use it for useful purposes or store the carrier medium for later use; the said solar radiation collector should preferably be useable as an architectural element such as a window pane or transparent roofing, thus allowing for the transmission of light into an architectural interior after it has completed its task of extracting appropriate energy from the solar radiation passing through it. The same solar radiation collector should also preferably collect heat and radiation reflected out of the same interior. The said solar collector therefore is preferably multi functional and may therefore be used as a fenestration member as well as a energy collector and preferably appear as a transparent glazing member, or as a patterned or textured or semi-opaque fenestration or cladding member within a building or other structure.

10. A solar radiation collector of claim 9 that comprises a method and apparatus for exposing microscopic organisms, such as algae, bacteria or plankton to solar radiation within said carrier medium (such as water), which is heated to an appropriate temperature for the growth and reproduction of said microscopic organisms, which may preferably may be used in other processes in related and connected systems, which for example may be the decomposition of organic matter and the production of methane gas, or the production of oxygen and hydrogen via a photosynthetic type chemical reaction within and outside of the said solar radiation collector. The said appropriate temperature may be regulated by the rate at which the said liquid or gas is circulated or pumped through the system.

11. A solar radiation collector of claim 9 that comprises a method and apparatus for regulating the amount and type of solar radiation that enters a building or other structure through the application of coating materials onto the glass or other preferably transparent or semi opaque members of the said solar radiation collector, which allows appropriate wavelengths of light through (such as those within the visible light spectrum) and absorbs heat and other energy that is required to pass though into the interior and instead traps and transfers the same energy to the carrier medium (said liquid or gas).

12. A solar radiation collector of claim 9 that comprises a method and apparatus for creating or augmenting the movement of fluid or gas within one or more cavities encased by glass or other preferably transparent or semi opaque material, using thermal syphoning, and/or capillary action and/or mechanical pumping, which may preferably be used to circulate or transport the same liquid or gas carrier medium to said Biotower or other connected systems in order to make use of the energy and/or the organic matter contained within the said liquid or gas.

13. A solar radiation collector of claim 9 that comprises one or more air passages and/or cavities that utilizes the thermal energy that is not collected by the said fluid or gas within the said cavity to heat the air in the said passage in order create the movement of air in a building or the like preferably to distribute heat within an architectural space when the external temperature is below a comfortable range and preferably the same air passage may be used to ventilate air within an architectural space when appropriate with the use of vents flaps and the like. The same air heated in the said passage may also be distributed around an architectural space with the use mechanical systems such as fans and ducts and the like.

14. A solar radiation collector of claim 9 that comprises a method and apparatus for hydrogen production utilizing either natural photosynthetic organisms or biomimetic/artificial photosynthetic systems.

15. A solar radiation collector designed to expose a carrier medium such as water or a water based synthetic complex to solar radiation within one or more cavities between or enveloped by two or more layers of glass or other preferably transparent or semi opaque material; the said water preferably contains man-made compounds able to harvest solar energy and to use it to produce hydrogen from water through

a process of artificial photosynthesis. This said artificial photosynthesis for hydrogen production from sunlight and water by direct photochemistry in synthetic complexes preferably should produce hydrogen (or other fuels) from solar energy and water. The heat trapped in the said water, due to its exposure to said solar radiation, may then be circulated or transported to said Biotower or other devices via pipes or ducts or the like for the transference of the same heat for use in the augmentation of the said updraft or other useful purposes or store the liquid for later use; the said solar radiation collector should preferably be useable as an architectural element such as a window pane or transparent roofing member, balustrade or the like thus allowing for the transmission of light into an architectural interior or space after it has completed its task of utilizing the appropriate energy from the solar radiation passing through it. The hydrogen or other useful substance produced via this said process of photosynthesis should preferably be captured by the said solar radiation collector and piped away preferably for use in the biotower or stored. The same hydrogen or other useful substance and may also be captured whilst the said carrier medium is being circulated or stored.

16. A solar radiation collector of claim 15 which exposes micro-organisms such as bacteria to solar radiation within said carrier medium (such as water), which is heated to an appropriate temperature in order to promote the growth and reproduction of same micro-organisms preferably for use in the said Biotower .

17. A solar radiation collector of claim 15 for the production of oxygen and hydrogen via a photosynthetic type chemical reaction whereby the appropriate temperature may be regulated by the rate at which the said carrier medium is circulated or pumped through the system.

18. A solar radiation collector designed to expose a carrier medium such as water or a water based synthetic complex to solar radiation within or below a pond or reflection pool, or architectural water feature; the said solar radiation collector is preferably positioned below a transparent separation medium such as a flat sheet of glass or other preferably transparent or semi opaque material; the said carrier medium below the said transparent separation medium preferably contains man-made compounds able to harvest solar energy and to use it to produce hydrogen from water through a process of artificial photosynthesis. This said artificial photosynthesis for hydrogen production from sunlight and water by direct photochemistry in synthetic complexes preferably should produce hydrogen (or other fuels) from solar energy and water. If the heat trapped in the said carrier medium is heated to an appropriate temperature, due to its exposure to said solar radiation, it may then be circulated or transported to the said Biotower or other devices via pipes or ducts or the like that transfer or extract the same heat and use it for useful purposes or store the liquid for later use; the said solar radiation collector should preferably be useable as an architectural element such as a water feature or transparent roofing member, or the like. The hydrogen or other useful substance produced via this said process of photosynthesis should preferably be captured by the said solar radiation collector and piped away preferably for use in the Biotower or stored and said hydrogen may also be captured whilst the said carrier medium is being circulated or stored.

19. A power plant of any of claims 7 and 8 in which the solar radiation collectors of claims 9 to 18 are incorporated to augment the functioning of the system. Preferably solar radiation collectors of claim 14 may be utilised in the outer layer of said transparent cladding of the said tower and the top layer of the said glass roof of claim 8 so that the fuel, such as hydrogen, thus generated may be used to augment the functioning of the tower via the use of fuel cells or by combusting the same fuel so as to augment the functioning of the said bio tower.

20. A heat exchange awning system which may preferably be integrated with the said tower of claims 1,5 to 8 and which transfers the waste heat of air conditioning systems of nearby buildings via a carrier medium circulation system (such as water pipes) integrated with the same awnings to the said tower; preferably the said street awnings would have a glass roof to allow light to pass through to street level and preferably the glass awnings will use the sun's radiation to maintain or increase the carrier medium's temperature in the said circulation system whilst it is circulating to the said tower; preferably the street awnings will be configured such that an air cavity separates two transparent glass roofing members which utilise the appropriate glazing types and coatings to create a said heat trap so that much of the sun's radiation is retained within the same cavity; preferably the heat thus retained may be used to heat a carrier medium circulated within the same cavity which may be circulated to the said tower to augment the functioning of the system via the release of the embodied heat thus gathered; preferably the same water circulating in the same cavity may be oxygenated, due to the manner in which it is allowed to flow, by air which is allowed to flow through the cavity and the same air may preferably be facilitated in its movement by being heated, creating a convection current in the same cavity created by the same trapped heat and also by the slope and/or shape of the said cavity allowing for a generally upward flow of air; preferably the same convection current may be used to drive micro turbines preferably to generate electricity and preferably the same convection current will be augmented with the use of a stack preferably connected to the highest part of the cavity and also preferably the said micro turbine would be

connected to the same stack; preferably a venturi may also be incorporated with the micro turbine if it improves its functionality. Preferably this same invention may be incorporated with the said plasma glazing of claims 9 – 17 that may be used as the upper layer of the awning system provided that enough heat is allowed to pass through to the said cavity thus allowing the proper functioning of the same heat exchange awning system.

21. A Biotower of claims 5 to 8 that may preferably be integrated with an underground circulatory system in which pipes are used to transfer the heat trapped by air conditioning systems of nearby buildings and preferably using hot water as a carrier medium to contain the said heat for transferral via the same pipes to the said tower; preferably the said pipes would be positioned under hard surfaces such as roadways and foot paths which normally absorb heat from the sun; preferably the same pipes would be positioned so that the pipes carrying the water (or other heat transfer medium) would be heated by the sun's radiation when appropriate so as to maintain or augment the heat gain of the system.

22. An underground circulatory system which may preferably be integrated with the said tower of claims 1,5 to 8 in which the heat absorbed by hard surfaces such as road surfaces and the like may preferably be collected by appropriate heat transfer mechanisms and circulated to the said tower with the use of pipes carrying water (or other heat carrier mediums) and released in the stack of the tower in order to augment the updraft of air; preferably the said heat transfer mechanism may consist of a series of pipes positioned below the surface of the road way in which water (or other heat carrier medium) would be circulated via secondary pipes before being circulated via primary pipes to the said tower; preferably heat from any appropriate heat absorbing surface may be transferred to the said tower by suitable heat transfer mechanisms; preferably the underground circulatory system of claim 21 may be installed and positioned in conjunction with this current aspect of the invention and preferably done so as to minimise heat loss by locating hot water pipes in the same locality. Preferably any heat loss from the this present aspect of the invention may be absorbed by the surrounding ground or mass so as to maintain the temperature of the water in the system when the original source of the heat is no longer providing heat. Preferably, when suitable, the said circulatory system may combine heat from different sources by running hot water (or other heat carrier mediums) in the same pipes.

23. A Biotower of claims 1,5 to 8 integrated with a heat transfer surface member that may form a new surface on an existing hard surface such as a roadway or a foot path in order to absorb the sun's radiation and transfer the heat thus gained to the said tower.

24. A Biotower of any of the above claims in which sewage and other organic matter is collected and allowed to decompose in such a way as to capture the biogas (including methane gas) thus generated in the same process; the said biogas preferably being utilised to augment the functioning of the said Biotower by preferably using the same biogas to power direct fuel cells to generate electricity and heat; the same heat may preferably be utilised to augment the updraft of air within the stack of the same Biotower and the electricity thus produced may preferably be utilised to augment or to compliment the production of the electricity generating turbines of the said Biotower.

The said organic matter, which is non methane producing, may preferably be decomposed with the use of hydrogen-producing acetogenic bacteria and the hydrogen thus produced may preferably be used to power fuel cells for the production of electricity and heat preferably for the augmentation of the system. The said fuel cells may also be integrated with an electricity-producing turbine in order to make more efficient use of its heat by-product via a method known as cogeneration before the same heat is used to augment the functioning of the main turbine(s) of the said Biotower. A range of high pressure to low pressure turbines may be utilised in combination in order to increase efficiency of the said Biotower.

25. An Biotower of any of the above claims in which sewage and other organic matter is collected and allowed to decompose in such a way as to capture the biogas thus generated; the said biogas may be combusted in order to augment the functioning of the said Biotower by increasing the updraft of air within the stack of the same tower. The said organic matter, which is non methane producing, may preferably be decomposed with the use of hydrogen-producing acetogenic bacteria and the hydrogen thus produced may preferably be combusted for the production of heat preferably for the augmentation of the tower.

Preferably the heat needed to facilitate the decomposition of the said organic waste for the production of biogas may be provided by the waste heat from the same air conditioning systems connected to the Biotower and all other appropriate heat sources including the waste heat from the said fuel cells and preferably the same heat may be released into the Biotower to augment the system after biogas has been extracted. Preferably when methane is not needed to run the Biotower, it may be stored and/or used by motor vehicles or converted into hydrogen gas.

26. A power plant of any of the above claims in which the water vapour that condenses on the inside face of the stack of the Biotower is collected and stored or piped away for useful purposes; preferably the said water may be stored within the stack of the Biotower during the day in such a way as to store the embodied heat as well as gather the heat from the sun in order to release the same heat into the tower

during the night and therefore help to extend the daily energy producing period of the system. Preferably the said water would be piped away for use elsewhere when it has cooled and the majority of the embodied heat released.

27. A power plant of claims 2 – 8 in which buildings or landforms in close proximity to the same Biotower are used to direct or other wise change the flow of wind in order to augment the functioning of the same Bio Tower.

28. A power plant and/or air pump substantially as herein described with reference to the accompanying drawings.